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REPORT ON THE EDUCATIONAL WORK OF SOME
EAST AMERICAN MUSEUMS.

*To the Board of Trustees and Members of the Chicago Academy
of Sciences:*

Pursuant to instructions from the Board of Trustees and the Executive Board, the curator visited Philadelphia as a delegate to the fourth meeting of the American Association of Museums. Subsequently the museums of New York, Brooklyn and Boston were visited for the purpose of studying the relation of the institutions in these cities to the public and especially to the

public school system. Acknowledgment should here be made to the directors of these institutions for their uniform kindness in freely placing all needed information at my disposal.

This report, which will necessarily be brief, is presented under two heads, the first dealing exclusively with the public school and the second with the relation of the Museum to the public.

THE PUBLIC SCHOOL.

Philadelphia Commercial Museums.—Only a few institutions deal directly with the public school. Chief among the institutions which aid in the teaching of nature must be placed the Philadelphia Commercial Museums, under the directorship of Dr. W. P. Wilson. This admirable institution has for several years prepared cabinets illustrating the natural resources of this and other countries and has given them to the schools of Pennsylvania on the simple condition that the latter provide the cases in which to store or exhibit them. Such subjects as cotton, hemp, wheat, textiles, coal and its by-products, gold, silver, lead and other minerals, are clearly treated by comprehensive collections, well labeled, and with many photographs illustrating the growth or manufacture of the several articles.

Recently a unique geographical collection has been prepared for use in the class-rooms of the ungraded schools of Pennsylvania. This consists of a cabinet of nine drawers, each drawer illustrating by a few well-selected examples the subjects of corn, rice, beverages, cocoanut, cotton, flax, silk, sheep (wool), and carbon. In a space beneath the drawers are placed specimens illustrating useful minerals and woods, together with a series of photographs illustrating scenes in the countries from which the specimens came, as well as charts of geographical distribution. This case is about four feet in height.

No collections are loaned to the schools of Philadelphia, for the reason that these are reached through the museum collections, contained in three large buildings, and by a series of lectures given by the staff of the museums to classes in the lecture hall. The following circular issued by the institution clearly indicates the purpose of these lectures:

The Philadelphia Museums continue to offer the schools of Philadelphia the privilege of coming in classes to study the collections from foreign countries and to listen to lectures along the line of their geographic work.

Visits to the museums are most profitable to children after considerable study of a country or region in the schoolroom.

At a time selected by the teacher, a class or classes may be brought to the museums, where they will be given a lecture on a subject selected from the accompanying lists.

Each lecture is profusely illustrated by lantern slides, most of which have been carefully colored with great fidelity to nature. The lectures are always adapted to the comprehension of the children who attend, especially those to the lower grades being given in very simple language.

At the close of the forty-five minute lecture the class will be divided into sections, and accompanied by competent guides, will be shown the products, manufactures and materials which appertain to the country or countries on which the lecture has been given.

The visiting classes should be restricted to not more than about one hundred pupils.

In all of the lectures it is the aim to show the close relation and commercial interdependence of all the people of the world. No opportunity is lost to emphasize such points as the influence of surface and climate on productions and on occupations of the people. Every effort is made to associate in the pupils' minds interesting facts connected with each country and the industries, products and manners and customs of the inhabitants.

Lantern slides, as well as various types of lanterns, are loaned to the city schools. The state of Pennsylvania contributes \$25,000 every two years for the maintenance of this work.

This institution also maintains strictly commercial relations with the business houses of this and other countries, furnishing a medium through which information concerning all manner of commercial questions may be satisfactorily settled. Space will not permit an adequate description of this part of the work. Suffice it to say that it is unique among the institutions of the world in this respect.

The American Museum of Natural History.—The American Museum of Natural History, under the direction of Dr. Herman C. Bumpus, prepares and sends out a large amount of material to assist in the teaching of nature in the schools of greater New York. There are 500 schools in New York, Brooklyn and Staten Island, and as many collections of birds, minerals, insects, mollusks and other invertebrates, as well as the common native woods, are in circulation among these schools. Collections are delivered and called for by an automobile operated by the American Museum. The purpose of these collections is stated to be as follows in a circular issued by the Museum:

"To meet the numerous requests received from teachers to supply them with nature-study material, the American Museum

of Natural History has prepared several small collections of natural-history specimens, which will be loaned for short periods to the public schools of Greater New York."

Loan collections of stereopticon slides, of which the Museum contains some 30,000, are also maintained.

The American Museum also provides an instructor, whose duty is to conduct parties about the museum, as well as to present nature-study lectures to school children.

The collections are in constant use and have proven of great value in the teaching of nature in this metropolis.*

The city of New York contributes over \$100,000 yearly for the maintenance of this and other public instruction work conducted by the American Museum, and the State Superintendent of Public Instruction contributes \$12,000 yearly.

The Children's Museum of the Brooklyn Institute of Arts and Sciences.—Of all the institutions visited this admirable little kindergarten of the natural sciences, under the direction of Miss Anna B. Gallup, the curator, appealed to me the most forcibly. It is maintained as a separate department of the Museum of the Brooklyn Institute, which is under the directorship of Dr. F. A. Lucas.

Here the child is dealt with as an immature, growing creature and the exhibits are arranged accordingly. They are for the most part placed low, so that the child may easily see the specimens and read the simple labels, which are printed in heavy, legible type. The exhibits are also of a very simple character. Among the many interesting exhibits which interest the children may be mentioned a wireless telegraph apparatus, a hive of living bees showing the process of honey making, aquaria and vivaria of many sorts containing familiar animals such as frogs, snakes, squirrels and water newts.

Loan collections are sent out to the schools of Brooklyn, and consist of native birds, insects, mammals, etc. Stereopticon slides are also loaned. Lectures are given almost daily in a room seating about 100 children. A most complete juvenile science library is maintained and is consulted by thousands of school children throughout the year. This institution is designed solely

*An excellent account of the school work of the American Museum will be found in the *Museums Journal* (English), Vol. VIII, pp. 303-313, 1909.

for the child, and is the most successful attempt yet made in this direction.

It is interesting to note that four young men have secured good positions as wireless telegraph operators on ocean steamships bound for South American, Mexican and West Indian ports, as a result of studies made in the Children's Museum, while students of Miss Lee, the instructor in physics.

The attendance at the Children's Museum in 1907 was as follows:

General attendance	97,805
Attendance at lectures.....	19,039
Recorded visits of teachers.....	699

The cost of maintenance of the Children's Museum in Brooklyn is about \$10,000 per year.

The Smithsonian Institution.—The Smithsonian Institution contains a children's room, in which the exhibits are of a simple character, but no attempt is made to induce the child to visit the museum or to care for it while there.

The Boston Society of Natural History.—The Boston Society of Natural History maintains no special relations with the public school system of Boston. A teacher's School of Science is operated under the auspices of the Society, in which, for a nominal fee, the school teachers are instructed in the natural sciences by able teachers from Harvard University and elsewhere. This department is maintained at a cost of about \$4,000 per year. The Boston Society loans specimens to individual teachers seeking aid, but no loan collections are systematically sent out.

The Newton Library.—The free library of Newton, Mass., maintains loan collections of bird pictures, photographs and stereoscopic views, illustrating different countries. The latter are loaned in sets with a good stereoscope. These are largely used in the schools of Newton, a city of about 40,000 inhabitants.

The Buffalo Society of Natural Sciences.—The Buffalo Society of Natural Sciences is carrying on a most valuable work in connection with the public schools of Buffalo. Illustrated lectures are given by the Secretary, Dr. Carlos E. Cummings, at the Society's rooms, to the children of the schools, the subjects chosen being birds, physiology, insects, native and foreign commercial products. During 1907, 190 lectures were given, at which the attendance was 19,731. Loan collections of specimens, covering a wide range of subjects, are continuously in circulation among the schools.

THE PUBLIC MUSEUM.

The following institutions were visited:

Institution.	Director or Curator.
Philadelphia Commercial Museums.....	Dr. W. P. Wilson
Academy of Natural Sciences, Philadelphia...	Mr. Witmer Stone
Pennsylvania Museum.....	Dr. E. A. Barber
Wistar Institute of Anatomy and Biology...	Dr. J. M. Stotsenberg
Wagner Free Institute of Science, Phil....	Mr. J. G. Rothermel
American Museum of Natural History, N. Y..	Dr. H. C. Bumpus
Brooklyn Institute Museum.....	Dr. F. A. Lucas
Children's Museum, Brooklyn.....	Miss Anna B. Gallup
Boston Society of Natural History.....	Mr. C. W. Johnson
Agassiz Museum, Cambridge, Mass.....	Mr. Samuel Henshaw
Free Library, Newton, Mass.....	Miss E. P. Thurston
Peabody Academy of Science, Salem, Mass..	Prof. Ed. S. Morse
Essex Institute, Salem, Mass.....	Mr. G. F. Dow

The fact at once impressed upon the mind by a comparative study of the institutions named is the evolution which all are undergoing in the nature of their exhibits. This evolution began in the National Museum and in the American Museum some twenty-five years ago when certain American birds and mammals were placed in natural groups. From that time to the present this evolution has been progressing and is now actively in process in nearly all public museums.

The impression made upon the mind of the ordinary visitor by the older methods of installation is one of utter bewilderment, the long series of nearly related objects, with their formidable Latin and Greek names, forming an incomprehensible jumble to the uninitiated, as has been so graphically described in a recent number of the *Outlook*.

Perhaps the best example of the newer and more educational method of museum display is seen in the American Museum of Natural History, where many thousands of dollars have been spent in an effort to bring science within the comprehension of the museum visitor. The birds of America, for example, are exhibited in groups which give the effect of looking at the bird in its native haunts, this effect being produced by the combination of painted background and artificial foliage. It is to be noted that these groups have been made possible through the private munificence of interested members of the Museum. One wonders, however, whether these groups do not rather detract from

the study of the individual specimens, by the elaborateness of the backgrounds, which are works of art, quite worthy of a place in any art museum. Other collections treated in an intelligent manner for the public are the Esquimo exhibit, the collection of North American woods, extinct North American mammals, gems, a few mammals, and the synoptic collection of invertebrates, where one stands in awe as he views the glass models of the mosquitoes, the cost of which would support some museums for a year.

The museum of the Brooklyn Institute is second only to the American Museum in its effort to educate the public, and in some respects it has even surpassed that mammoth institution in this regard, a case in point being the excellent exhibits illustrating insect metamorphoses. The success of the simple clouded background in several of the bird exhibits is also worthy of mention. The exhibit illustrating life under the sea, as well as that of protective coloring and adaptation, are examples of concrete museum exhibition for the benefit of the public. The local collection of Long Island birds shows how effectively local material may be used.

Perhaps the greatest evolution is to be seen in the halls of the Boston Society of Natural History. Under the present able curatorship this museum has been completely rearranged. Special emphasis is being placed on the collection of New England fauna and flora, and an attempt, which promises to be eminently successful, is being made to exhibit a complete collection of the natural resources of this area. The bird groups of this collection are especially good and convey facts to the mind of the visitor not obtainable by any other method. The mammals are being treated in like manner. With a larger and more modern building and enlarged resources the Museum of the Boston Society could easily become the New England center for the popular exposition of Nature, a position which naturally belongs to it. Boston should have a public museum comparable with the American Museum in New York, and, like the public library, supported by public taxation. "If public libraries, why not public museums?"

The museum of the Academy of Natural Sciences of Philadelphia has been going through a like evolution, and under its able curator is emerging from the older into the newer method of public instruction. Few people realize, however, the almost

insurmountable difficulties surrounding the work of rehabilitating an old society museum with the methods of the past century still firmly holding the hearts of many of the members.

The Children's Museum of Brooklyn has already been mentioned and little needs here to be said, excepting to mention the unique exhibits illustrating types of early settlers, which are prepared in little groups of small figures dressed and environed becoming the times which they so vividly portray.

Commercially, the Philadelphia Commercial Museums far surpasses anything of the kind in America. The exhibits are arranged to illustrate the commercial products of the world, their mode of manufacture, means of transportation, etc. Nothing comparable to this institution is known, and its work is of such a character that it is not likely to have a rival for many years. Much of the exhibitivie and special school work, however, may be duplicated with profit by western institutions.

The majority of the other institutions visited were founded for a specific purpose and do not attempt to systematically educate the public. The Philadelphia Museum is doing some excellent work in this direction, but it is an historical and not a Natural History Museum. The Agassiz Museum, or the Museum of Comparative Zoölogy, as it is more correctly designated, is a purely University Museum, where no attempt is made to instruct the lay public, although it is open freely to visitors every day in the week, including Sunday afternoon from 1 to 5 o'clock. As a University Museum where research is the governing principle, this institution is unsurpassed by any similar museum in America.

RECOMMENDATIONS.

A study such as it has been the curator's privilege to make naturally fills one with unbounded enthusiasm, and recommendations need to be made with caution. It is quite apparent that an opportunity of more than usual magnitude is before the Academy. This opportunity is plainly indicated not only by the lack of certain nature work in our city, but also by the unanimous expressions of the heads of the various institutions visited. The Chicago schools are in a recipient mood for nature work, and it would appear that all things were conspiring together to open up a very useful place for the Academy in the educational advance of the city.

Reducing the information obtained to a concrete considera-

tion of the situation, I would make the following recommendations:

1. The addition of another building to contain a lecture hall and a library.

2. The present library room to be reconstructed for the purposes of a children's room, to contain a few characteristic exhibits, a library and a reading room. Aquaria and vivaria to be maintained either there or in the basement.

3. The preparation of loan collections of birds to be followed, as time permits, by collections in other lines of nature.

4. The preparation of several economic collections illustrating the manufacture of familiar commodities, such as cotton, wheat, aluminum, iron, silver, etc.

5. Loan collections of slides, stereoscopic views or pictures.

6. The further enlargement of the research collection of Mollusks to the extent, at least, of embodying as complete a geographic collection of the North American Fauna as it is possible.

7. Active co-operation with the State Academy of Sciences in its efforts to conduct an ecological survey of the state.

8. The gradual rearrangement of the museum to the end that the exhibits shall illustrate the fauna and flora of Illinois and adjacent portions of the Mississippi Valley. The bird collections should be largely arranged to illustrate the home life of our native birds, and for this purpose a number of larger corner cases should be provided, built upon lines similar to those in New York and Brooklyn. The preparation of small groups of the nesting birds of Illinois should be continued. The other departments should be gradually rearranged to meet the present needs of the community and the public at large.

In making the above recommendations it is realized that they are much beyond our present resources. It is believed, however, that a beginning can be made with our present income and there is no apparent reason why interest enough cannot be aroused to secure an additional endowment of half a million of dollars and the funds sufficient for the erection of the much-needed building.

In submitting this report I wish to express my thanks to the members of the board of trustees for their kindness in thus affording me the opportunity of studying in detail the institutions herein mentioned, an opportunity which I trust may be reflected in the near future in a more useful condition of our museum.

Very respectfully,

FRANK COLLINS BAKER,
Curator.

PROPOSED EDUCATIONAL WORK FOR THE CHICAGO ACADEMY OF SCIENCES.

During the present year we have been investigating the problem of educational work that the Academy might appropriately undertake in addition to conducting the Museum. The Museum is truly educational and the exhibits have been arranged with special care from the educational point of view. The Academy is, however, in a position to enter some new field of activity. Our interests in the natural sciences and in the promotion of a true scientific spirit suggest that one of the appropriate lines of work is in connection with the science teaching in the schools of the city. As a quasi-public institution, it is appropriate for the Chicago Academy of Sciences to take an active part in co-operating with the public schools for the purpose of improving the teaching of science. There is no reason why we should not co-operate with private schools and we hope to sustain cordial relations with all such institutions.

In investigating this problem, we have taken every precaution to ascertain just what the situation in the schools is today, and what the real needs appear to be. Several conferences have been held at the Academy with the teachers of the North Side schools, and on two occasions officers of the Academy have attended meetings of the principals of the North Side schools and presented the question of co-operation between the Academy and the public schools. District Superintendent Lowry has been present at several of these meetings and has indicated a very deep interest in the proposed plans and a willingness to promote the plans of co-operation. Conferences have also been held with members of the high school force who are engaged in the teaching of natural sciences. With them it is similarly apparent that the Academy may play an important part in assisting the teachers to improve and promote science teaching. During the spring about twenty-five sample museum collections were prepared by Mr. Baker and offered for loan to the schools, to ascertain whether there was a real demand for such material. It was impossible to supply the demand with the twenty-five collections. They were in use almost continuously from the time they were ready for distribution until the close of the school year.

After these several conferences had been held and numerous suggestions made by the officers of the Academy and by the teachers and principals of the schools and by District Superintendent

Lowry, a meeting was held at which the following definite proposals were unanimously approved by the principals of a large number of the North Side city schools:

1. Museum loan collections.
2. Picture loan collections.
3. Lantern slide loan collections.
4. A lecture-study course for teachers.
5. An afternoon course of talks or informal exercises in Nature Study for children.
6. The publication of leaflet reading slips to accompany loan collections or as supplementary reading in science work.
7. Admission to evening lectures of student delegates from upper grades.

The Executive Board of the Academy has approved the above plans and the Board of Trustees has appropriated funds for supporting the work. Extra help has been engaged to assist in collecting and mounting suitable material for the loan collections and this material will be arranged as rapidly as possible. The loan collections of slides and of pictures will receive attention later. Plans have been perfected for a teachers' lecture-study course, and during the fall Dr. Henry C. Cowles, of the University of Chicago, will give 12 two-hour lessons, some of which will be in the field, to teachers who may wish to take this work. The work will be in the study of botany from the ecological point of view and be of special value to the teachers doing work in botany in the high schools and to all teachers giving nature-study work in the elementary schools. A special announcement of this work is given on another page.

Plans have been made for the children's course. This venture is one which has been highly recommended by various members and friends of the Academy, and from the work which is now being done in other cities, appears to be a most attractive field for the Academy to enter. Thousands of children visit the Museum each year, and it is highly desirable that special arrangements be made for them as soon as possible. We should have, as some of the leading institutions in the east now have, a children's room. A properly-equipped children's museum with a children's meeting room would be unique in Chicago and a most commendable institution for endowment. Our last large increase to our funds came to us chiefly because of our attitude and treatment of the little people who come to the Academy building. We

are in an ideal location for a museum to which children may safely come and we are in close sympathy with any work which will appeal to the interests and lead to the general improvement of the children who may come to Lincoln Park. There is little doubt, if a new building was dedicated to the children, but that it would be attended in larger numbers than any other museum in the city, and the possibilities of accomplishing real good work with young people far exceed the possibilities with adults. The Academy is in a position to appeal to Chicagoans for the support of this line of work and it is hoped that before long sufficient endowments may be secured to place this on a firm basis and assure its future.

During the fall there will be the usual course of Friday evening popular lectures open to the public. There will be the regular meeting of the Academy and probably some special meetings.

The interest and co-operation of each of the members of the Academy is solicited in connection with the new lines of work which the Academy has undertaken, and the officers will welcome any suggestions that may be received.

WALLACE W. ATWOOD,
Secretary of the Academy.

THE MOLECULAR CONSTITUTION OF SOLIDS.*

BY DR. J. E. SIEBEL.

According to the author, it is supposed and generally so stated that, owing to complex movements and forces supposed to be present in solid bodies, there must be special difficulties to which it is due that the molecular thermodynamics and kinetics of solids can not be fully accounted for on the same basis as those of the gaseous bodies.

The present paper is calculated to show that the supposed difficulties are largely imaginary and that there are a notable number of solid and liquid substances for which, according to the calculations and tables presented by the author, no essential difference exists regarding the mode and kinetic energy of the motion of their molecules as compared with those of gaseous bodies.

In support of this, it is shown that the total heat energy at

*Abstract of paper presented at the regular meeting of The Academy, July 27, 1909, published in full in "Original Communications of the Zymotechnic Institute, Chicago," for October.

the melting point of metals, in which the molecule probably consists of one or but few atoms, can be found by doubling the latent heat of melting (2 l), while the total heat energy of the liquid at the same point can be found by trebling the latent heat of melting (3 l).

The author further shows that the amount of heat energy of a solid body thus calculated is equivalent to the total kinetic energy $\frac{Mv^2}{2}$ of the molecules, calculated from the molecular

velocity of the body, which velocity is determined in the same manner as is done in case of gaseous bodies in accordance with the kinetic gas theory.

As another proof of the author's assertions it is shown that the heat energy of many solid bodies calculated by multiplying the absolute temperature degrees of the melting point with the amended specific heat (T_s) is found to be practically identical with the energy quantities (2 l) and $\frac{Mv^2}{2}$ found as before stated.

Tables are submitted illustrating these conditions for Mercury, Silver, Cadmium, Tin, Bismuth, Potassium and Platinum.

It is also shown in another table that chemical combinations such as water, saltpeter and chloral-hydrate follow the same rule if the splitting of their molecule at melting is duly considered.

To further establish the identity of the kinetics of solids and gases a third table demonstrates that the interior energies of the permanent gases can be calculated with correct results on the basis of molecular velocities deducted from the latent heat of melting of solids.

As another corollary an original experiment is quoted, according to which a drop of water is suspended in a liquid of equal specific gravity below its freezing point, when the globular form of the drop changes into an ellipsoidal form as soon as it freezes, indicating that the abstraction of the latent heat of melting is accompanied by an apparent loss of energy in the perpendicular direction.

Some of the principal results of these investigations may, according to the author's summary, be itemized as follows:

1st. The absolute zero of temperature — 273° Cels. as derived from the kinetic conditions of gases may be derived from the kinetic conditions (molecular movements) of solids by identical processes of reasoning and calculation.

2nd. In the case of many solid elements, as well as also for many combinations of simple constitution, their total internal heat energy is chiefly kinetic energy approximately expressible by the product of their corrected specific heat with the absolute temperature (T_{s1}).

3rd. The heat energy of such solid elements at their melting points may likewise be expressed approximately by doubling their latent heat of melting, 2 l, and in the case of chemical combinations in which the molecule splits during melting by 1 l; the total heat energy of the liquid body at its melting point being three times its actual latent of melting (3 l).

4th. The molecular velocities of solids may be calculated from the same principles on which the kinetic theory of permanent gases is based.

5th. The total kinetic energy of a body calculated according to these velocities is approximately the same as that derived from the latent heat of melting and also the same as that derived from the specific heat and the absolute temperature.

6th. Accordingly we have obtained three different arithmetical expressions for the kinetic energy of a solid body, viz., T_s , 2 l, and $\frac{Mv^2}{2}$, every one of which is derived from differ-

ent experimental data and by different processes of reasoning, but all of which give approximately identical results, thereby making all conditions of matter amenable to the same general kinetic principles, at least with respect to the substance under consideration in this treatise.

7th. The molecular constitution of solid bodies is not essentially different, and, indeed, in many cases even less complex, than that of gaseous bodies, so that the translatory energy of elastic spheres alone may suffice to account for their kinetic conditions.

MEMBERSHIP IN THE ACADEMY.

For many years the Academy has had a membership composed chiefly of those persons who have been associated with the work of the Academy for many years, and who were interested in the promotion of scientific work and scientific education in the city. These members have been either Active, Honorary, Corresponding or Life Members. The entrance fee for Active Members is five dollars, and the annual dues are five dollars. These Active Members have entire control of the activities of

the Academy. They receive a copy of each publication issued by the Academy during their term of membership and are admitted to all lectures or meetings held by the Academy. The Active Members elect the members to the Board of Trustees, and this board has the responsibility of caring for the funds of the institution.

At a regular meeting held July 27th, 1909, amendments to the constitution were adopted establishing an Associate Membership, open to all persons residing in Chicago or vicinity, who are in sympathy with the objects of the Academy.

Associate Members have all the privileges of Active Members except those of voting and holding office. There is no initiation fee for Associate Members and the annual dues are but three dollars.

The Academy is undertaking several new lines of educational work and increasing the number of publications, and it is hoped that the Associate Membership in the Academy will be attractive to a large number of Chicagoans, and especially to residents of the North Side. During the coming Fall Quarter, the Associate Members will have the privilege of attending:

All Regular Meetings, for which there will be special programmes prepared.

The Popular Lecture Course of six lectures.

The Lecture Study Course (size of class limited).

Special Meetings.

During the year 1910 there will be lecture courses and other features of interest.

Each person becoming a member of the Academy before January, 1910, will receive a copy of the Bulletin by Dr. Will Sayer Moffatt, on "The Higher Fungi of the Chicago Region," and will, on the payment of one year's dues, have all the privileges of membership until January, 1911.

Applications for membership should be made to the Secretary of the Chicago Academy of Sciences, Lincoln Park, Chicago.

PUBLICATIONS.

Since the last number of this bulletin was distributed, the Academy has issued Bulletin No. VII, Part I, of the Natural History Survey of the Chicago District. This bulletin was prepared by Dr. Will Sayer Moffatt and is entitled "The Higher Fungi of the Chicago Region," Part I, "The Hymenomycetes."

The Bulletin contains one hundred fifty-six pages of text and twenty-four half-tone plates. This work is a very welcome contribution to the Natural History studies which have been carried on in and about Chicago. Dr. Moffatt has made a most careful study both in the field and in the laboratory and has presented his results in as simple a form as such technical data would permit. The work will prove of interest to all who frequent the outlying, less densely settled district for study or recreation, and will be of special value to careful students of botany. A copy of this bulletin has been sent to each member. To those not members the price is one dollar.

FALL ANNOUNCEMENTS.

LOAN COLLECTIONS.

At the opening of the fall the Academy will have the following twenty loan collections ready for use:

BIRDS.

1. Winter Residents.
2. Residents.
3. Early Spring Arrivals.
4. Summer Residents.
5. Birds that live mostly in the Air.
6. Birds that live mostly in the Fields.
7. Birds that live mostly in Swamps.
8. Birds of the Shores of Lakes and Ponds.
9. Birds of Prey.
10. Seed-eating Birds.

ECONOMIC COLLECTIONS.

11. The Pearl Button Industry.
12. The Ivory Button Industry.
13. Iron Ores.
14. Coal.
15. Silk Industry.
16. Silver, Gold, Copper, Lead, and Tin Ores.
17. Common Rocks.
18. Aluminum Ores.
19. Artificial Abrasives.
20. Pond Snails. To be used with an aquarium.

These collections will be loaned for a period of one week to members of the Academy, or to teachers in public or private

schools, who will be responsible for their return in good condition for the Academy.

The larger boxes, containing Bird Collections, may be carried by two students from the upper grades of the grammar schools. The other boxes are smaller and may be carried by one student from the upper grades of the grammar schools.

TEACHERS' LECTURE-STUDY COURSE.

Special arrangements have been made to have Dr. Henry C. Cowles of the University of Chicago offer to a limited number a course of 12 two-hour lessons on Plants and Their Field Relations. This course will be especially valuable to teachers of Nature Study in the elementary grades and to teachers of Botany in High Schools.

PLANTS AND THEIR FIELD RELATIONS (ELEMENTARY ECOLOGY).

This course presents plants as living organisms which carry on activities, and which are profoundly modified by environmental conditions. Among the topics considered are: The work of leaves in relation to light, the work of stems and roots, autumn coloration and its significance, trees and their battle for life, the functions of flowers and seeds, water plants, plants of dry soils and climates, protection against the severe conditions of winter. In the early autumn there will be frequent field trips. The lectures will be abundantly supplemented by lantern slides.

Each student will be matriculated and registered in the University of Chicago without additional expense, and on the satisfactory completion of the course credit for one minor taken in residence will be received.

This course will begin Saturday at 9 A. M., September 25, at the Academy building, Lincoln Park, and continue until Saturday, December 11.

FEES.

To active and associate members of the Academy. \$2.00
To persons not members of the Academy. 6.50
All fees should be paid on or before Oct. 15, 1909.

Associate membership in the Academy is open to any person residing in Chicago or vicinity who is in sympathy with the objects of the Academy. Associate members have all the privi-

leges of active members except those of voting and holding office. The annual fee of associate members is \$3.00. Those joining before October 15th have the privilege of membership until January, 1911.

Persons wishing to become members of this class should communicate with the secretary of the Academy as soon as possible.

WALLACE W. ATWOOD,
Secretary, Chicago Academy of Sciences,
Lincoln Park, Chicago.

NATURE STUDY LESSONS.

During the fall Dr. H. S. Pepoon, of the Lake View High School, will conduct a series of six lessons in Nature Study for young people. These lessons will begin Saturday at 2 P. M., October 16, at the Academy building. The syllabus for the course is given below:—

NATURE STUDY LESSONS

FOR

YOUNG PEOPLE.

- I. The Common Fall Flowers.
 - a. The prevalence of the Complex or Composite type.
 - b. The predominance of yellow and the meaning of color.
 - c. The color-groups of the 1,400 Chicago area flowers and their pollination schemes. Color chart.
 - d. The gentians. Flower hardiness. The blue color.
 - e. The last entries in the flower calendar.
 - f. The spring and fall dandelions.
 - g. One dozen good examples of fall flowers.
 - h. The domesticated flowers of the fall garden.
- II. Fruits of Autumn, and Seed Dissemination.
 - a. The invariable purpose of all natural fruits.
 - b. The types of the various disseminations and their effectiveness. Comparison of wind, animal and water types.
 - c. The artificial fruit produced by man. The methods adopted. The commerce in fruits.
 - d. The seeds. Their size, number, and other peculiarities. Seed collections.
 - e. Weeds and their fruit and seed features.

III. The Leaves.

- a. The general idea of the work of leaves.
- b. The life-duration of various leaves. Evergreen leaves, —so called.
- c. Some of the main leaf features.
- d. The deciduous leaf. Why it falls. Why some assume brilliant colors.
- e. The seven common type forms with familiar examples.
- f. Leaves and forest soil.
- g. Man's use of leaves.
- h. Leaf collections.

IV. Preparation for Cold Weather.

- a. The casting of foliage.
- b. The formation of the winter rosette on the root crown.
- c. The various food storage plans.
- d. The difference in annual, biennial and perennial.
- e. The buds and their covering. True and false interpretations.
- f. Sap in winter.
- g. Special schemes for immunity from cold.

V. The Winter Twig.

- a. The twig features and their interpretation.
- b. The reading of a twig's history.
- c. How to know trees by their bare twigs.
- d. The changes from youth to age.
- e. Twig collections.

VI. Animals and Cold Weather.

- a. The migratory habits of many birds.
- b. Why some birds remain.
- c. The hibernation of ground squirrel, lizard, snake and frog.
- d. How some mammals remain active.
- e. Water animals in winter.
- f. Insects with their three plans of winter survival.

Delegates from the eighth grade rooms of the North Side schools will be received as members of this course until the class limit has been reached. If more apply than can be accommodated in one section, a waiting list will be kept and another section may possibly be organized.

The object of receiving delegates from different schools is to arrange so that reports of the work which is done at the Academy in this series of lessons may be given to as many of the grades as possible.

Each applicant must present a letter from the room teacher, stating that he or she has been appointed delegate for that room.

FRIDAY EVENING LECTURE COURSE.

The Friday evening popular lecture course will be open October 22nd with an illustrated lecture on "The Glaciers of North America" by Dr. Wallace W. Atwood, Secretary of the Academy.

Announcement of the other lectures in this course will be made later.

REGULAR MEETINGS.

During October there will be a meeting and reception to President T. C. Chamberlin, and in November there will be a regular meeting of the Academy, for which a special programme will be prepared.

